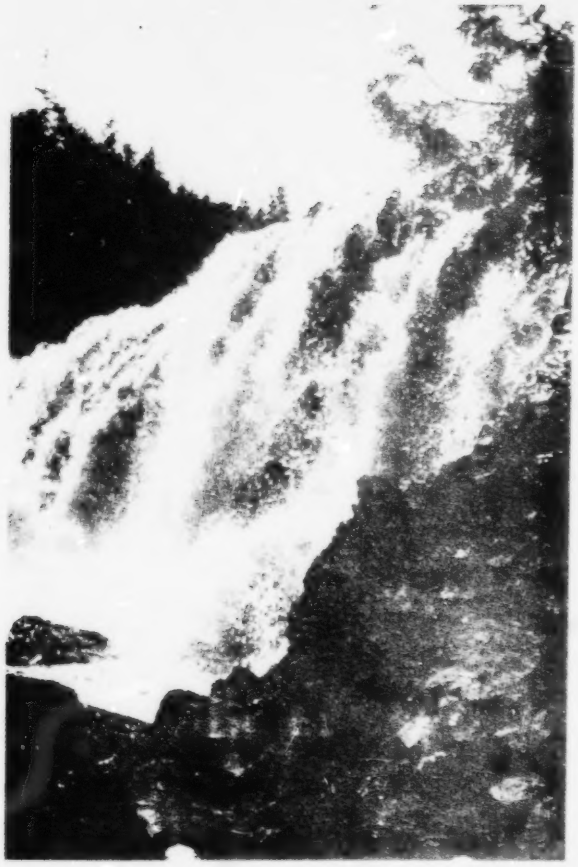
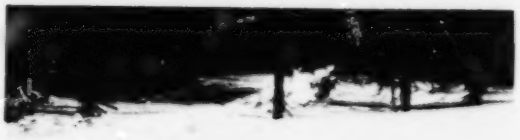
Pukaskwa National Park





Natural Resource Conservation

Environment Canada

Parks Service

91-04379/

Cirsium pitcheri MONITORING REPORT
PUKASKWA NATIONAL PARK
1990

Larry Vien
Park Warden
Pukaskwa National Park

October, 1990
Canadian Parks Service
Environment Canada

Distribution List

Original	(1)	Resource Conservation, Pukaskwa National Park
Copy	(1)	Resource Conservation, Ontario Regional Office
Copy	(1)	Library, Ontario Regional Office
Copy	(1)	National Documentation Centre Program Headquarters, Ottawa
Copy	(1)	Environment Canada Library Program Headquarters, Ottawa

ABSTRACT

Data from the 1990, Cirsium pitcheri (Asteraceae) monitoring program are presented and compared to previous years results. All data collected are presented with respect to demographics, habitat and critical limits. Management recommendations are made as a result of this year's population trend and upon consideration of the draft report of a consultant's study aimed at establishing future management direction for Cirsium pitcheri.

Key Words: rare, monitoring

Citation:

Vien, L. 1990. Beach Thistle (Cirsium pitcheri) Monitoring Report: 1990. Unpublished internal report, Canadian Parks Service, Pukaskwa National Park. Heron Bay, Ontario. 45 p.

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1.0 INTRODUCTION

Cirsium pitcheri (Asteraceae), commonly known as Pitcher's thistle, is considered to be Pukaskwa National Park's rarest plant (Resource Conservation 1986). As part of the Canadian Parks Service's commitment to resource protection, an ongoing monitoring program of the two colonies within the Park takes place annually. The monitoring program's function is to elucidate trends in population dynamics so that well-informed management decisions may be made if the need arises.

Population data will be tabulated and analysed and management recommendations will be made. Data will be presented in such a way as to be complementary to the Cirsium pitcheri Data Consolidation (Moreland 1988).

2.0 FIELD WORK/METHODS

Monitoring was carried out at the Creek Beach and Crescent Beach Colonies (both at Oiseau Bay, Pukaskwa National Park), on July 17, 18 and 19, 1990. The monitoring was carried out by Park Warden Larry Vien, Senior Park Warden Greg Fenton, and Native Student Daniel Michano.

Plants were counted by sectioning the colonies into 5 m intervals with flagging tape, then searching 1.25 m^2 blocks, sectioned off with sticks stuck in the ground.

The metal post installed in 1988 was used to locate the starting point of the Crescent Beach colony, which now contains only 29 intervals as a result of a spring run-off wash out which eliminated intervals 30 to 36 and created a new course for Oiseau Creek. The anchor point for the Creek Beach Colony remains on the protective fence at interval 37.

3.0 POPULATION DATA

A summary of the population data is presented here in Section 3.0. Figures 1 to 6 compare totals for all years of monitoring. Section 3.1 presents data on the maturation rate of seedlings. For the actual field data, refer to Appendix I and II.

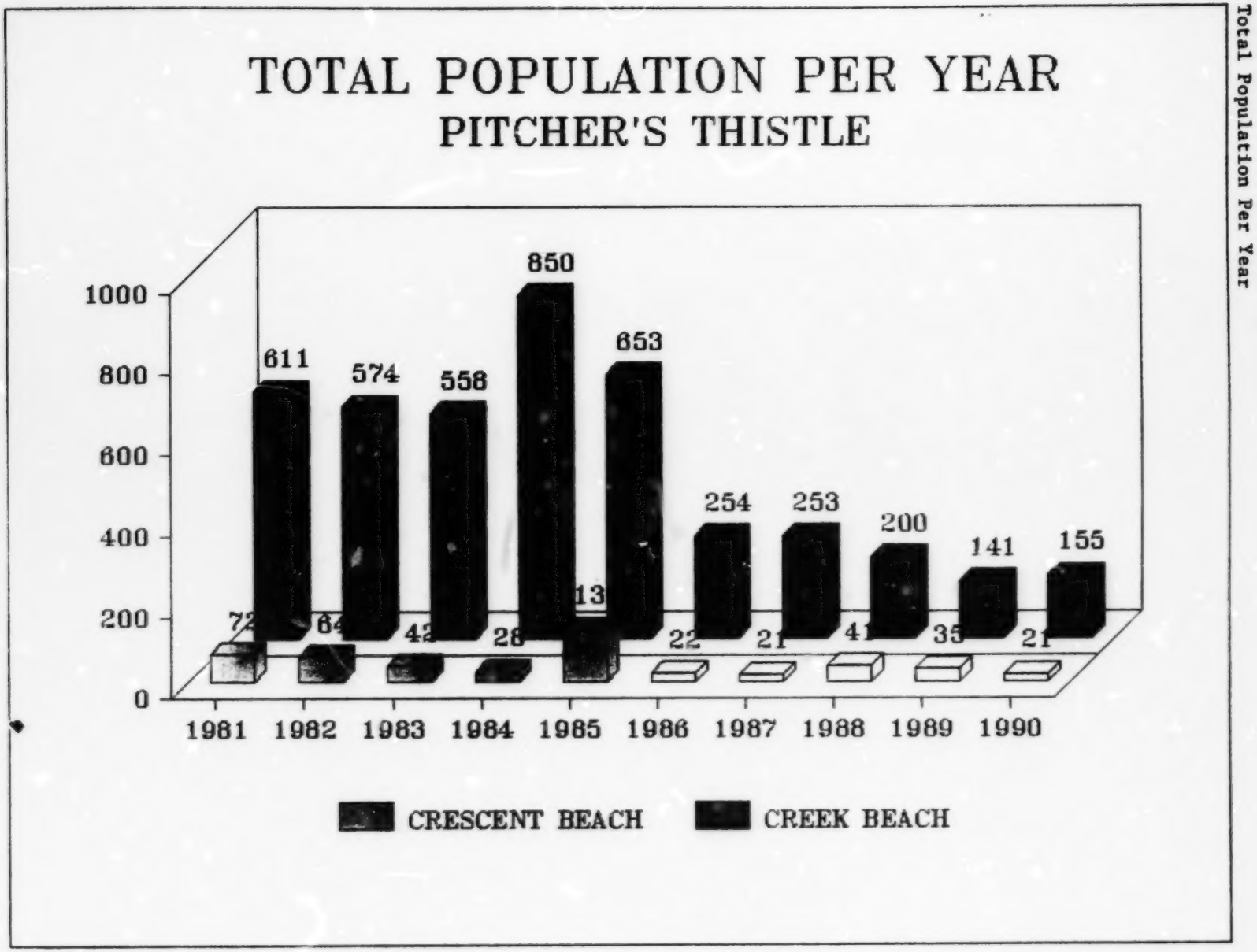
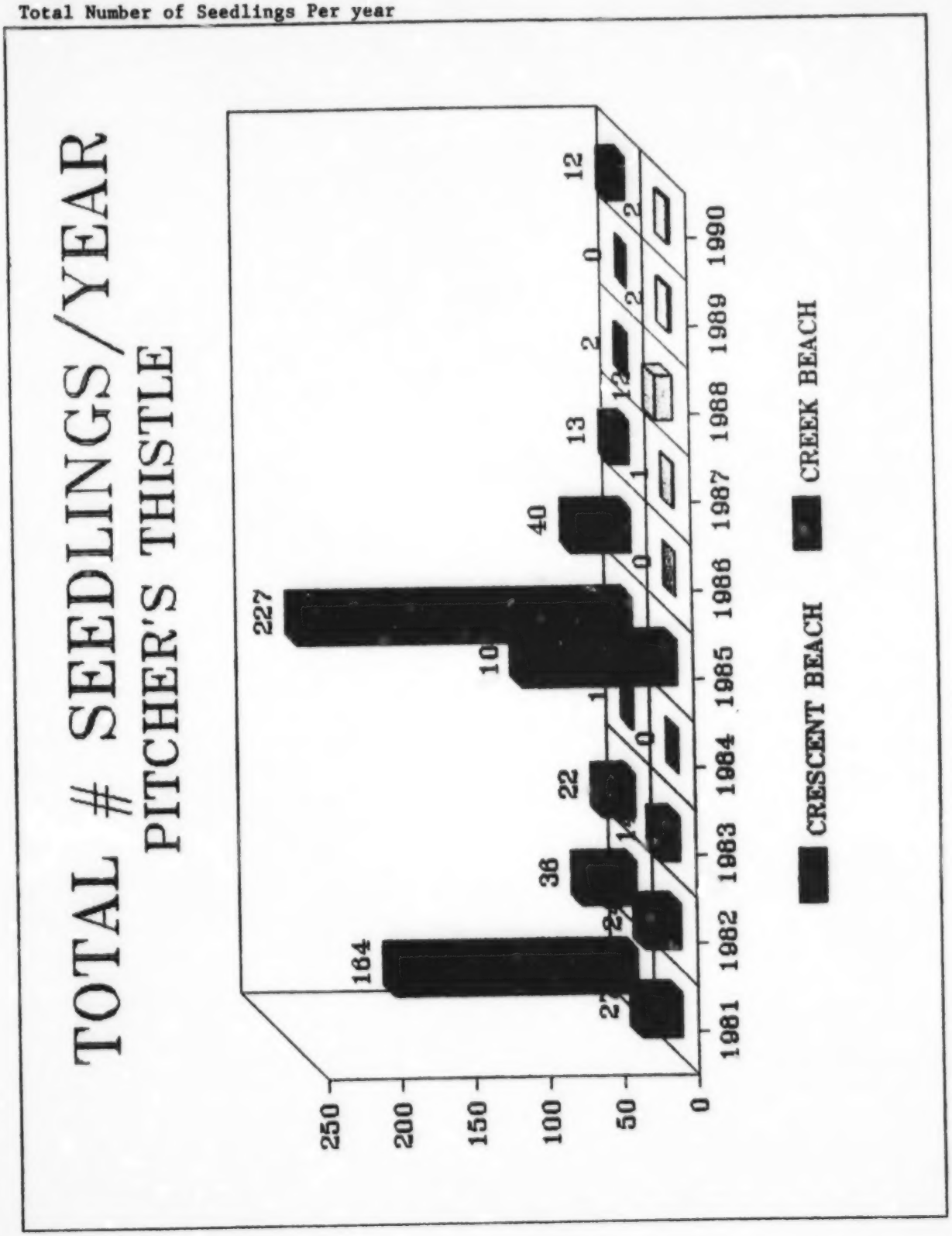


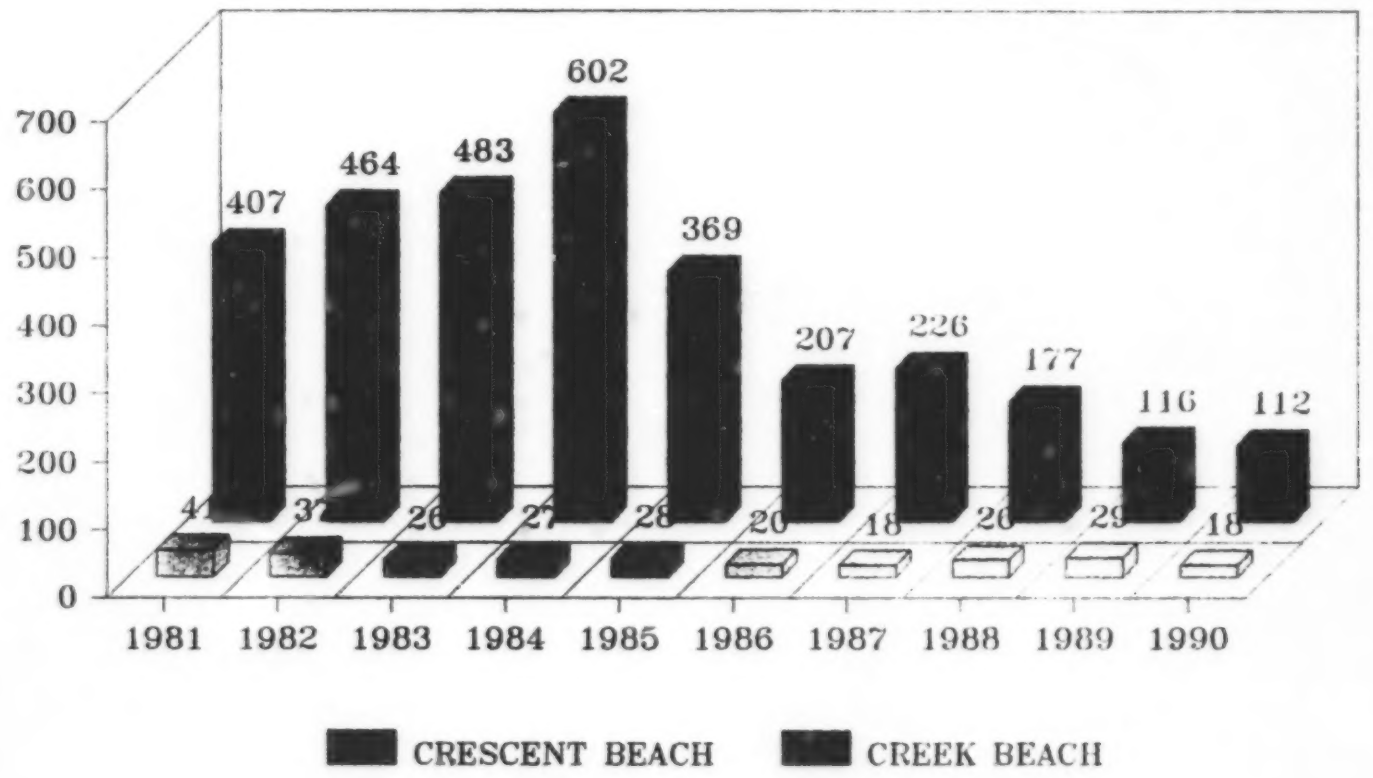
Figure 1
Total Population Per Year

Figure 2

Total Number of Seedlings Per year



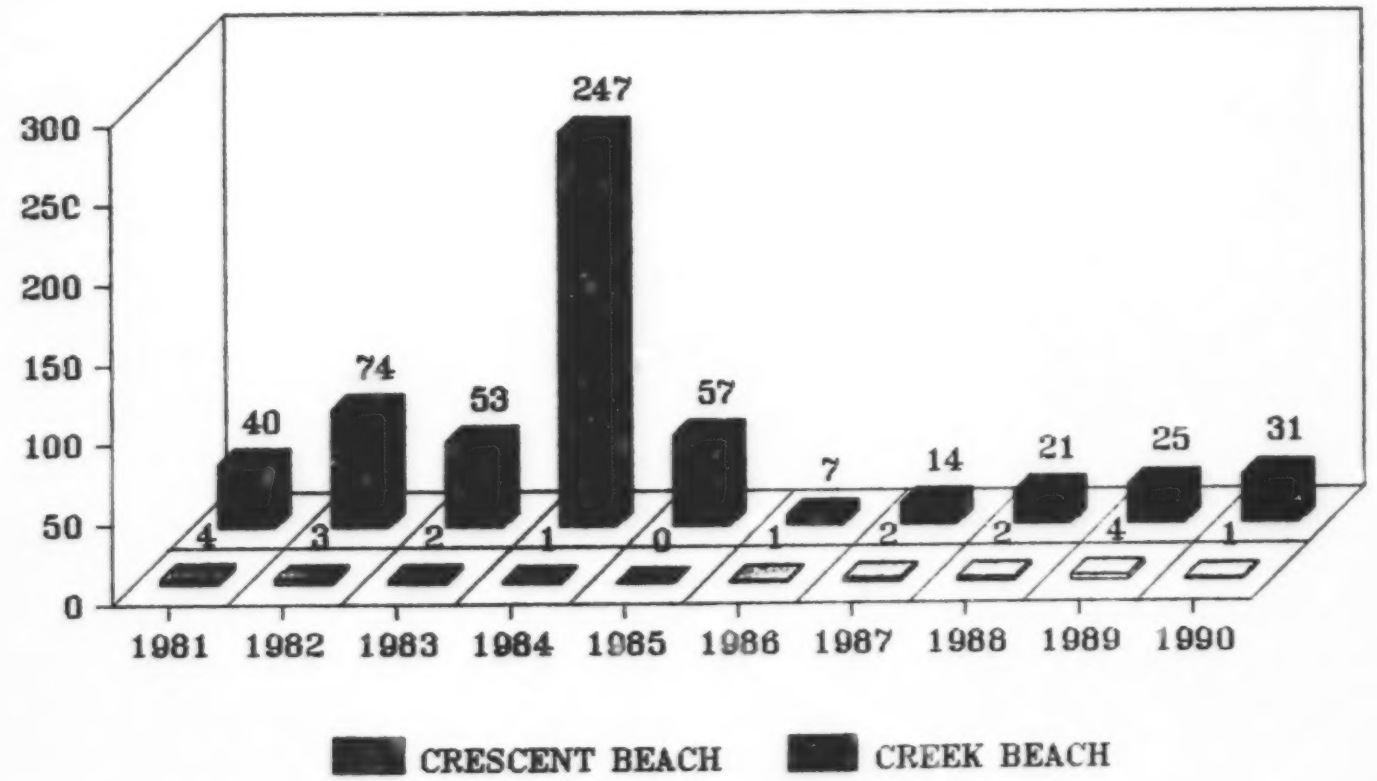
TOTAL # ROSETTES / YEAR
PITCHER'S THISTLE



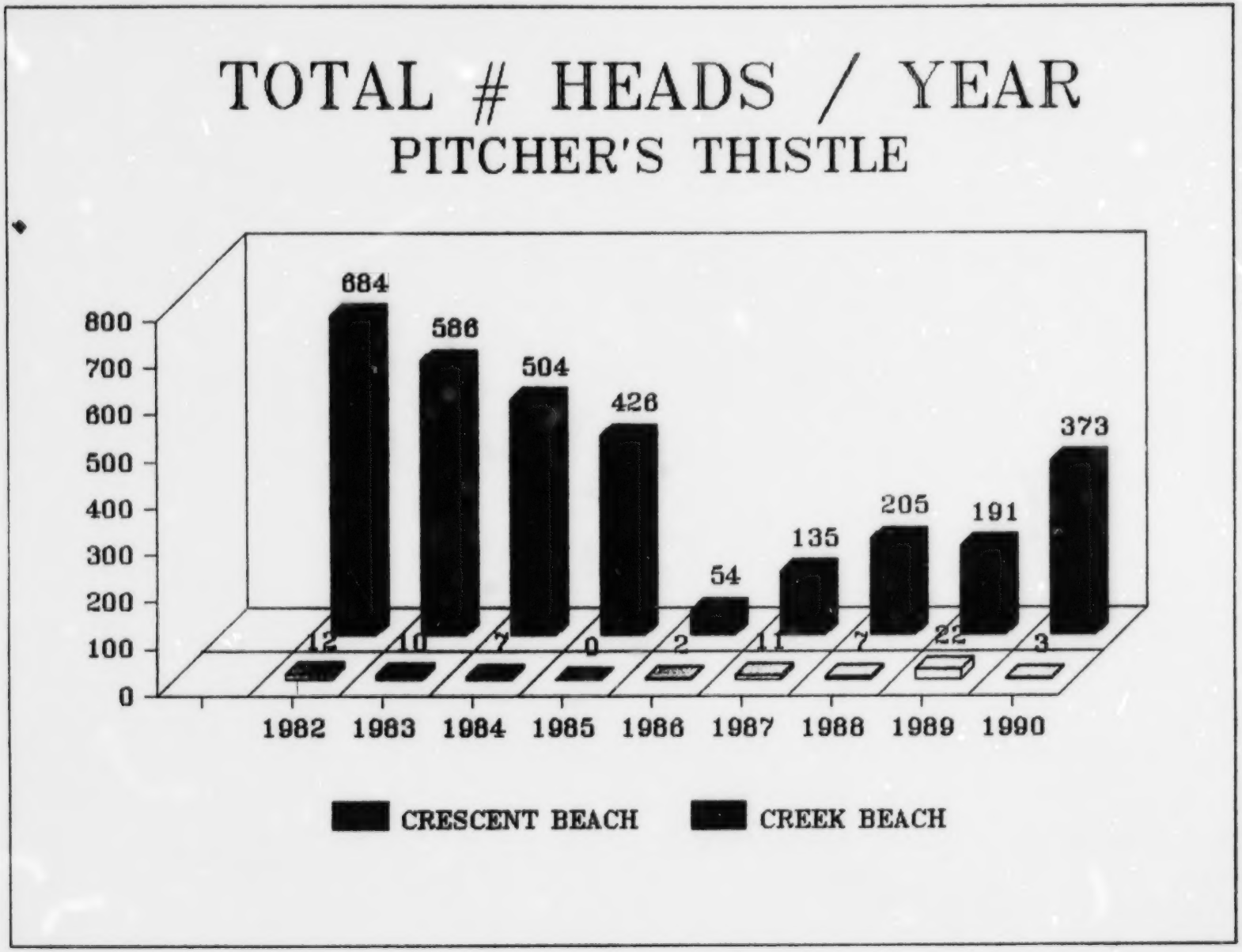
Total Number of Rosettes Per Year

TOTAL # FL. PLANTS / YEAR

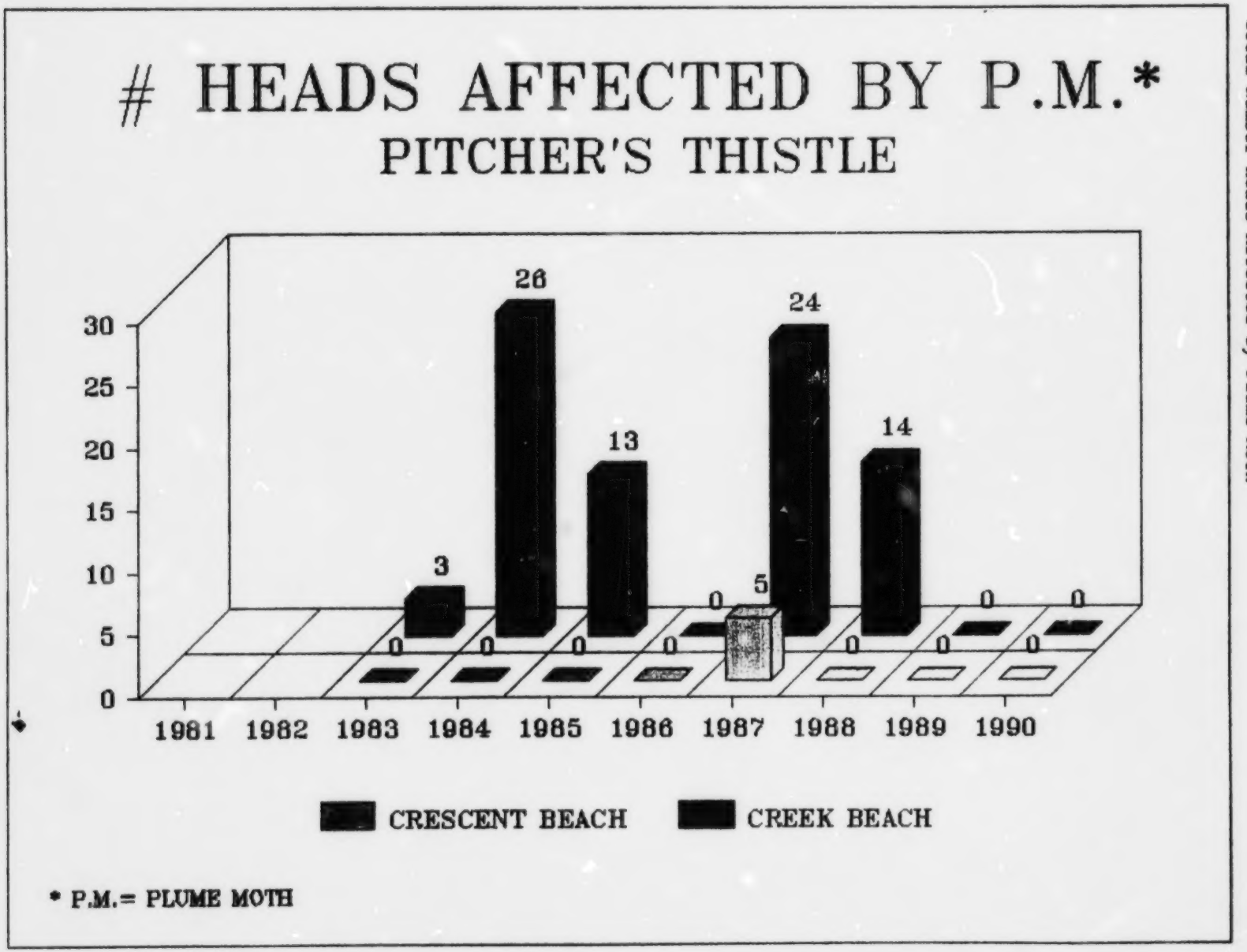
PITCHER'S THISTLE



Total Number of Flowering Plants Per Year



Total Number Heads Per Year



Total Number Heads Affected by Plume Moth

3.1 Maturation Rate of Seedlings

In order to determine the life span of C. pitcheri in Pukaskwa National Park, it is necessary to follow individual plants from seedling (the first season of growth) to flowering plant (after which the plant dies). Section 3.1.1 to 3.1.9 follow seedlings tagged in a given year: those which reach maturity and flower are listed by their tag number under the year of maturation.

3.1.1 Seedlings Germinated in 1981

Year	CREEK BEACH COLONY # of Flowering Plants	Tag #	CRESCENT BEACH COLONY # of Flowering Plants	Tag #
1981	0	N/A	0	N/A
1982	0	N/A	0	N/A
1983	0	N/A	0	N/A
1984	1	20	1	64
1985	0	N/A	0	N/A
1986	1	41	0	N/A
1987	2	7, 44	0	N/A
1988	1	33	0	N/A
1989	1	34	0	N/A
1990	0	N/A	0	N/A

3.1.2 Seedlings Germinated in 1982

Year	CREEK BEACH COLONY # of Flowering Plants	Tag #	CRESCENT BEACH COLONY # of Flowering Plants	Tag #
1982	0	N/A	0	N/A
1983	0	N/A	0	N/A
1984	0	N/A	0	N/A
1985	0	N/A	0	N/A
1986	0	N/A	0	N/A
1987	1	10	0	N/A
1988	3	100, 102, 103	0	N/A
1989	0	N/A	0	N/A
1990	0	N/A	0	N/A
1991				

3.1.3 Seedlings Germinated in 1983

Year	CREEK BEACH COLONY # of Flowering Plants	Tag #	CRESCENT BEACH COLONY # of Flowering Plants	Tag #
1983	0	N/A	0	N/A
1984	0	N/A	0	N/A
1985	0	N/A	0	N/A
1986	0	N/A	0	N/A
1987	0	N/A	0	N/A
1988	0	N/A	0	N/A
1989	0	N/A	0	N/A
1990	0	N/A	0	N/A
1991				
1992				

3.1.4 Seedlings Germinated in 1984

Year	CREEK BEACH COLONY # of Flowering Plants	Tag #	CRESCENT BEACH COLONY # of Flowering Plants	Tag #
1984	0	N/A	N/A**	
1985	0	N/A		
1986	N/A*			

* The solitary tagged seedling of 1984 was found dead in 1986.

** No seedlings were found in 1984.

3.1.5 Seedlings Germinated in 1985

Year	CREEK BEACH COLONY # of Flowering Plants	Tag #	CRESCENT BEACH COLONY # of Flowering Plants	Tag #
1985	0	N/A	0	N/A
1986	1	199	0	N/A
1987	1	197	0	N/A
1988	0	N/A	0	N/A
1989	1	195A	0	N/A
1990	3	197A, 201A, 202A	0	N/A
1991				
1992				
1993				
1994				

3.1.6 Seedlings Germinated in 1986

Year	CREEK BEACH COLONY # of Flowering Plants	Tag #	CRESCENT BEACH COLONY # of Flowering Plants	Tag #
1986	0	N/A	N/A*	
1987	0	N/A		
1988	0	N/A		
1989	1	273		
1990	0	N/A		
1991				
1992				
1993				
1994				
1995				

* No seedlings were found in 1986.

3.1.7 Seedlings Germinated in 1987

Year	CREEK BEACH COLONY # of Flowering Plants	Tag #	CRESCENT BEACH COLONY # of Flowering Plants	Tag #
1988	0	N/A	0	N/A
1989	0	N/A	0	N/A
1990	0	N/A	0	N/A
1991				
1992				
1993				
1994				
1995				

3.1.8 Seedlings Germinated in 1988

Year	CREEK BEACH COLONY # of Flowering Plants	Tag #	CRESCENT BEACH COLONY # of Flowering Plants	Tag #
1988	0	N/A	0	N/A
1989	0	N/A	0	N/A
1990	0	N/A	0	N/A
1991				
1992				
1993				
1994				
1995				

3.1.9 Seedlings Germinated in 1989

Year	CREEK BEACH COLONY # of Flowering Plants	Tag #	CRESCENT BEACH COLONY # of Flowering Plants	Tag #
1989	0	N/A	0	N/A
1990	0	N/A	0	N/A
1991				
1992				

4.0 ASSOCIATED SPECIES

There were few associated animal species observed this year. A Red-sided Garter Snake (Thamnophis sirtalis parietalis) was observed at the Creek Beach colony. There were no observations of butterflies or moths (including Plume Moth).

The associated plant species list remains the same as that produced by Keddy (1981).

5.0 HABITAT CHANGES AND EXPANSION

Since the extensive erosional damage of 1986 there has been little further damage due to erosion at Creek Beach. The cut banks caused by the storm in 1986 have changed only slightly with respect to further slumping while the associated plant species and the Pitcher's Thistle itself continue to re-establish on these banks. (See Figure 7)

There has been another significant change at Crescent Beach. Spring run-off caused Oiseau Creek to alter its course (Figure 8) and in the process has completely eroded what little had remained previously of intervals 30 to 36. (See Figure 9) In 1989, 19 of the 35 plants recorded for Crescent Beach were located in intervals 30 to 36. Seepage of ground water is still occurring intermittently along the beach. A large delta/lagoon has been formed where Oiseau Creek now runs into the lake (Figure 10).

Lake Superior's level has not risen significantly over the previous year and there remains a large expanse of sand at Crescent Beach between the water line and the colony.

Figure 7. Creek Beach - July, 1990

Figure 8 Altered Course-Oiseau Creek - July, 1990

Figure 9.
Erosion of Intervals 30-36 Crescent Beach

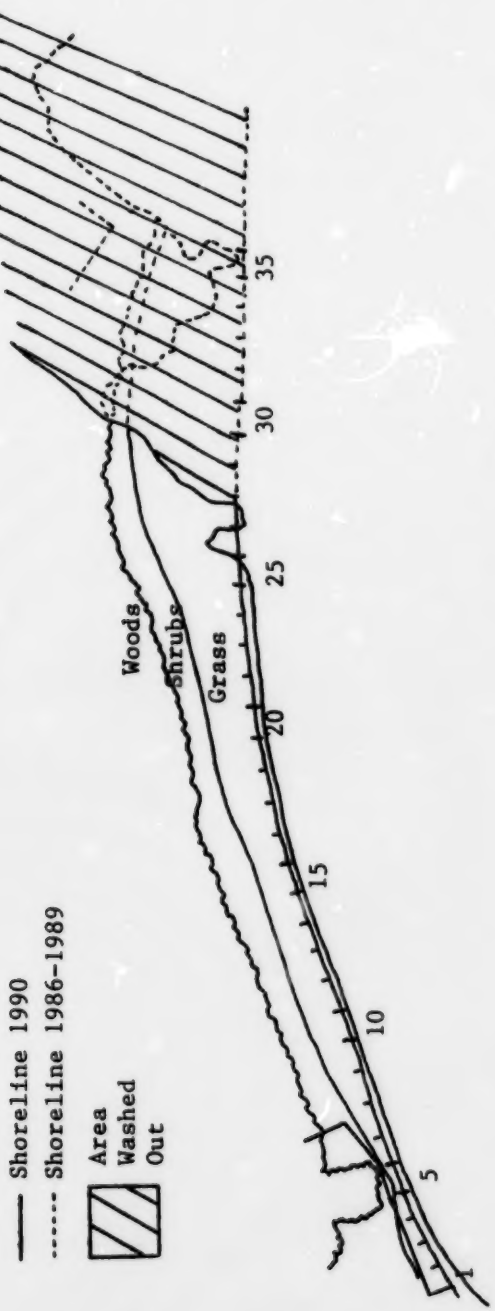
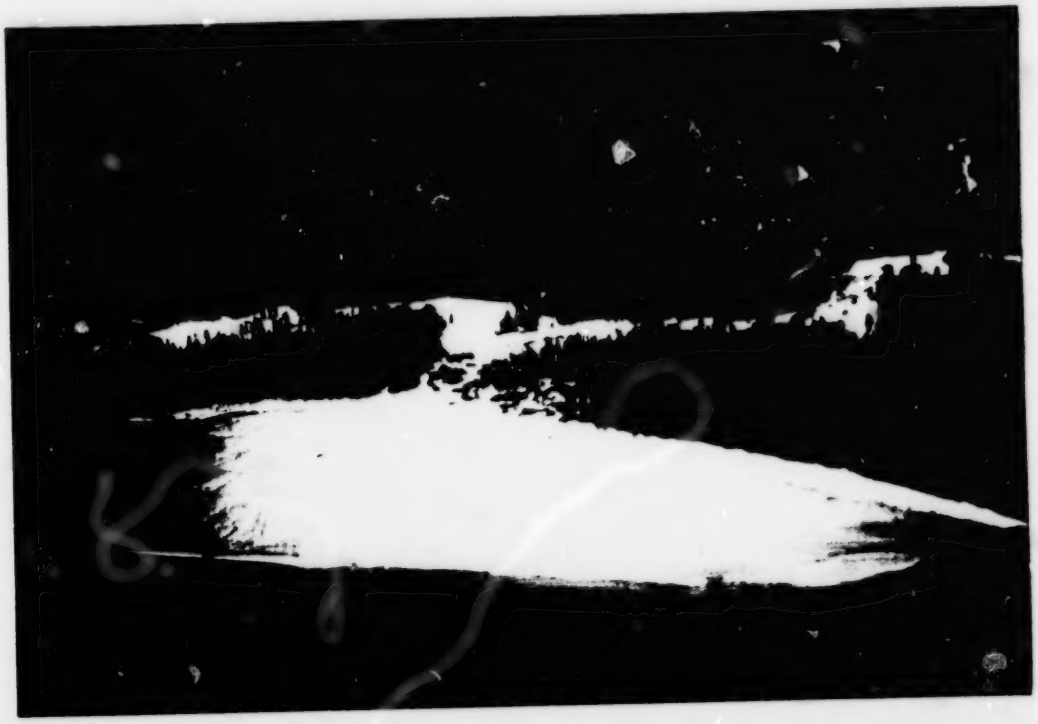


Figure 10 Oiseau Creek Delta - Crescent Beach - July 17, 1990



6.0 VISITOR ACTIVITY

There was no visitor activity noted in either colony during the monitoring period.

There appears to be relatively little pedestrian traffic along the beach in front of both colonies. The Coastal Hiking Trail has been routed to by-pass the worst of the washed out section of Crescent Beach. The thistle colony is now separated from the junction of the trail and the beach by the new Oiseau Creek outlet. Hikers will now be even less inclined to proceed along the beach toward the thistle colony.

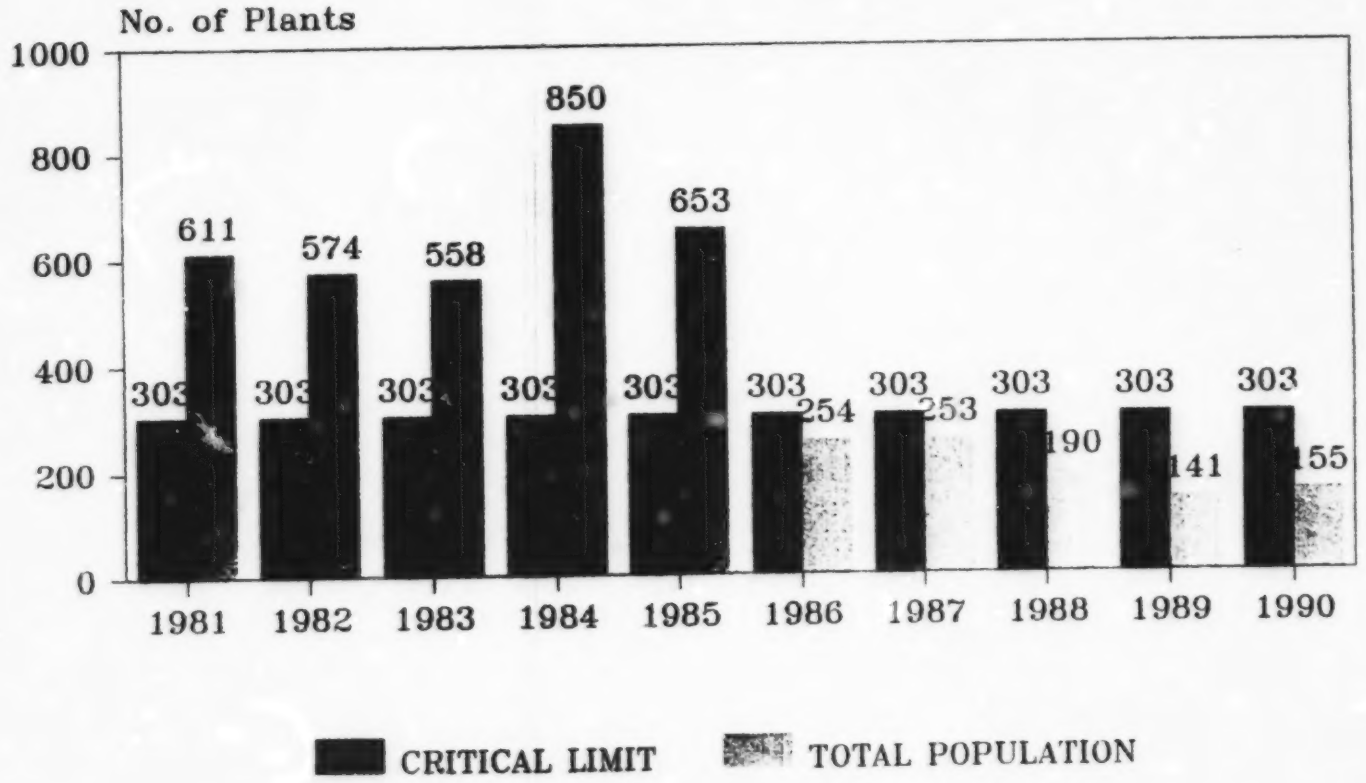
The interpretive sign informing visitors of the presence of the thistle and advising them to avoid the colony area was washed out with the spring run off. With the new more natural barrier (Oiseau Creek) new considerations may be taken with regard to any interpretive message to visitors.

7.0 CRITICAL LIMITS

In 1986, due to the modified method of counting rosettes, the critical limits for population totals were adjusted by applying the calculated adjustment factor. In 1988 the adjustment factor was re-calculated and the critical limits modified accordingly. A draft report by a consultant which will recommend future management actions has further refined the adjustment factor and will be modifying critical limits. Until a final report is approved the critical limits set in 1988 as per adjustment factor will be used as the basis of comparison in this year's monitoring report.

Figures 11 to 20 show the comparative data over the monitoring years relating to established critical limits.

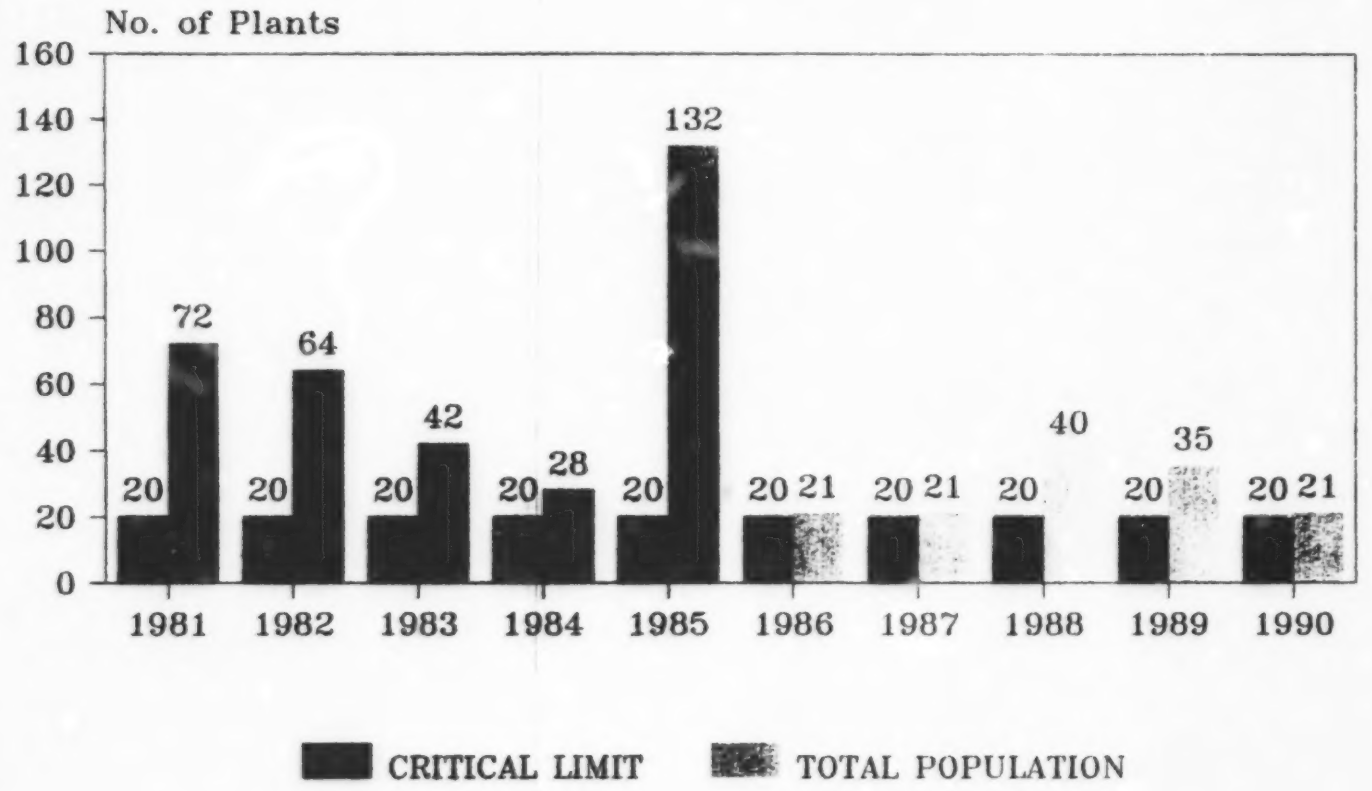
CRITICAL LIMITS *
CREEK BEACH



* as per Moreland, 1988

Critical Limits - Total Population (Creek Beach)

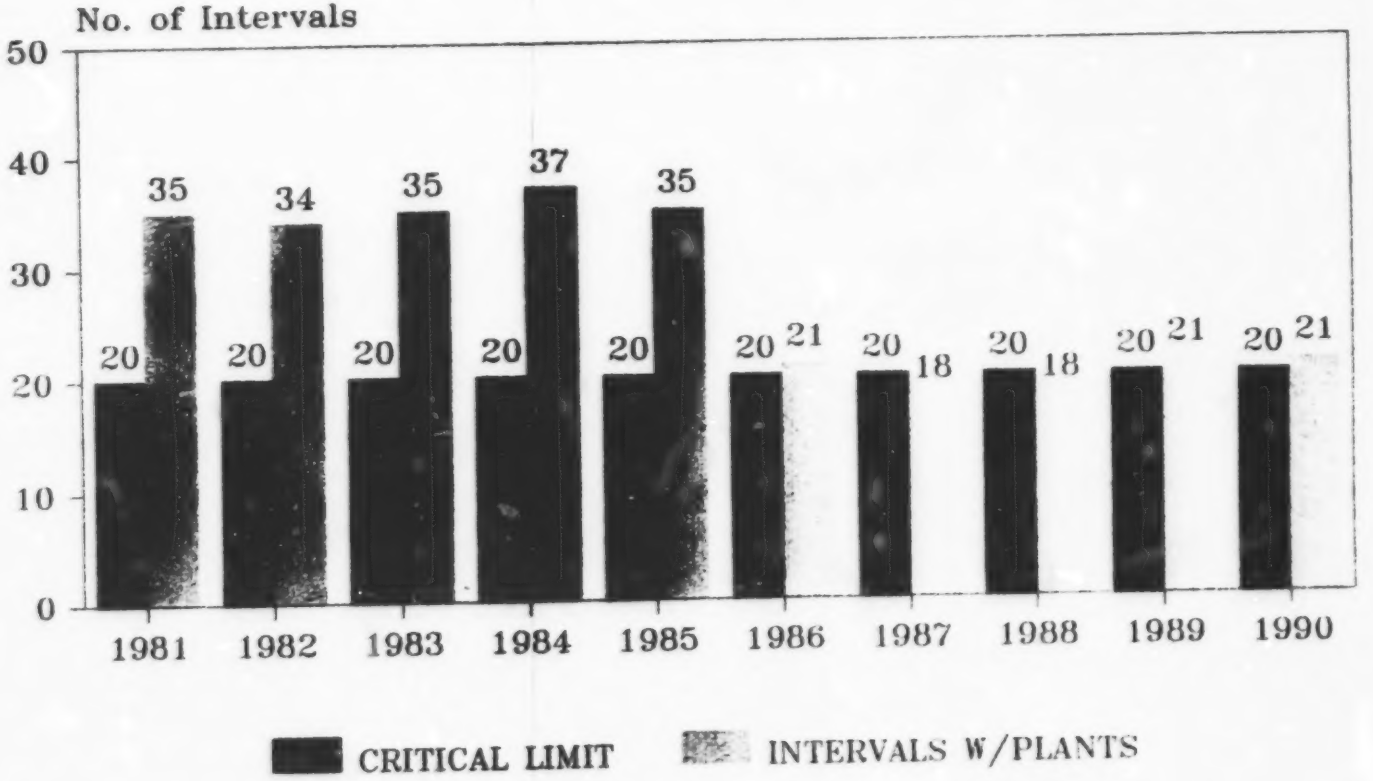
CRITICAL LIMITS *
CRESCENT BEACH



* as per Moreland, 1988

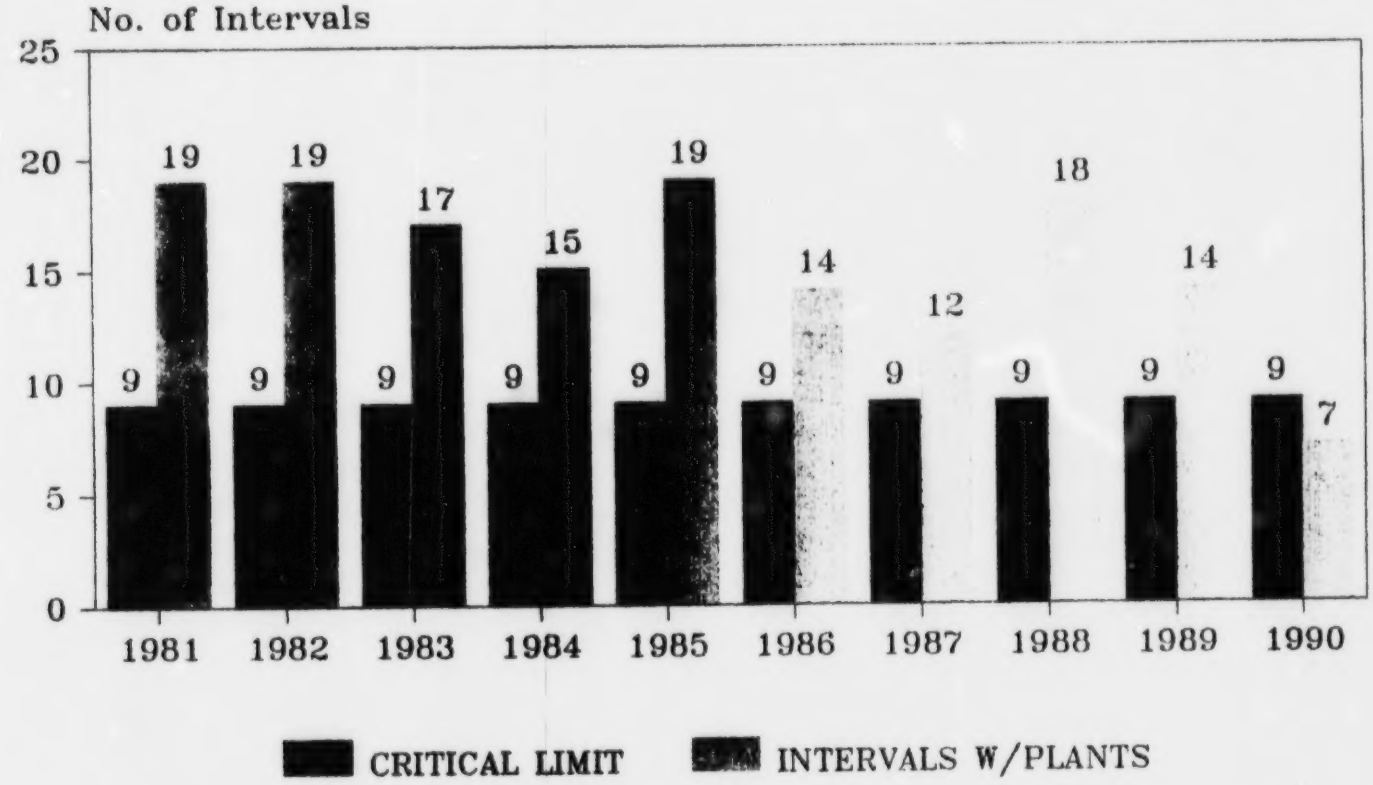
Critical Limits - Total Population (Crescent Beach)

CRITICAL LIMITS *
CREEK BEACH



* as per Moreland, 1988

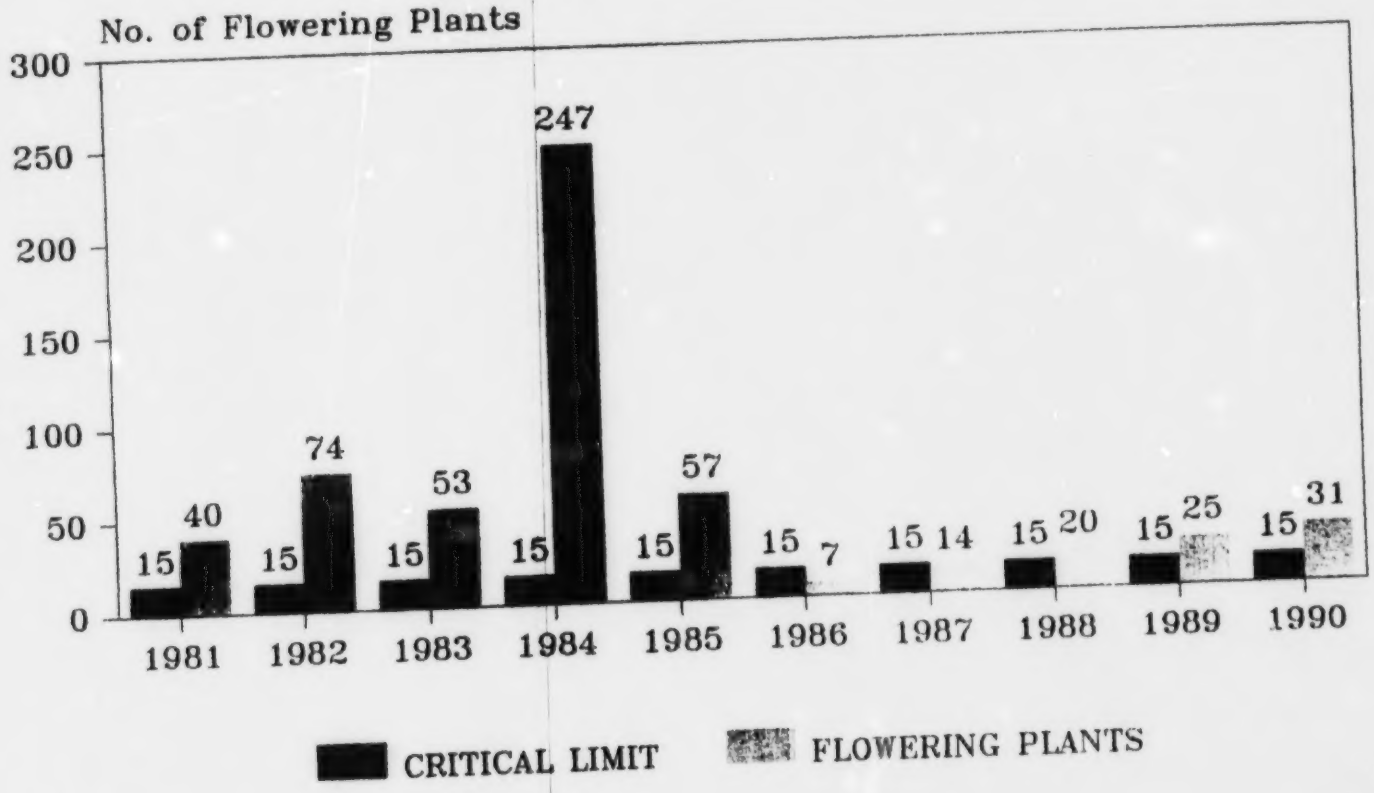
CRITICAL LIMITS *
CRESCENT BEACH



* as per Moreland, 1988

Critical Limits - Intervals With Plants (Crescent Beach)

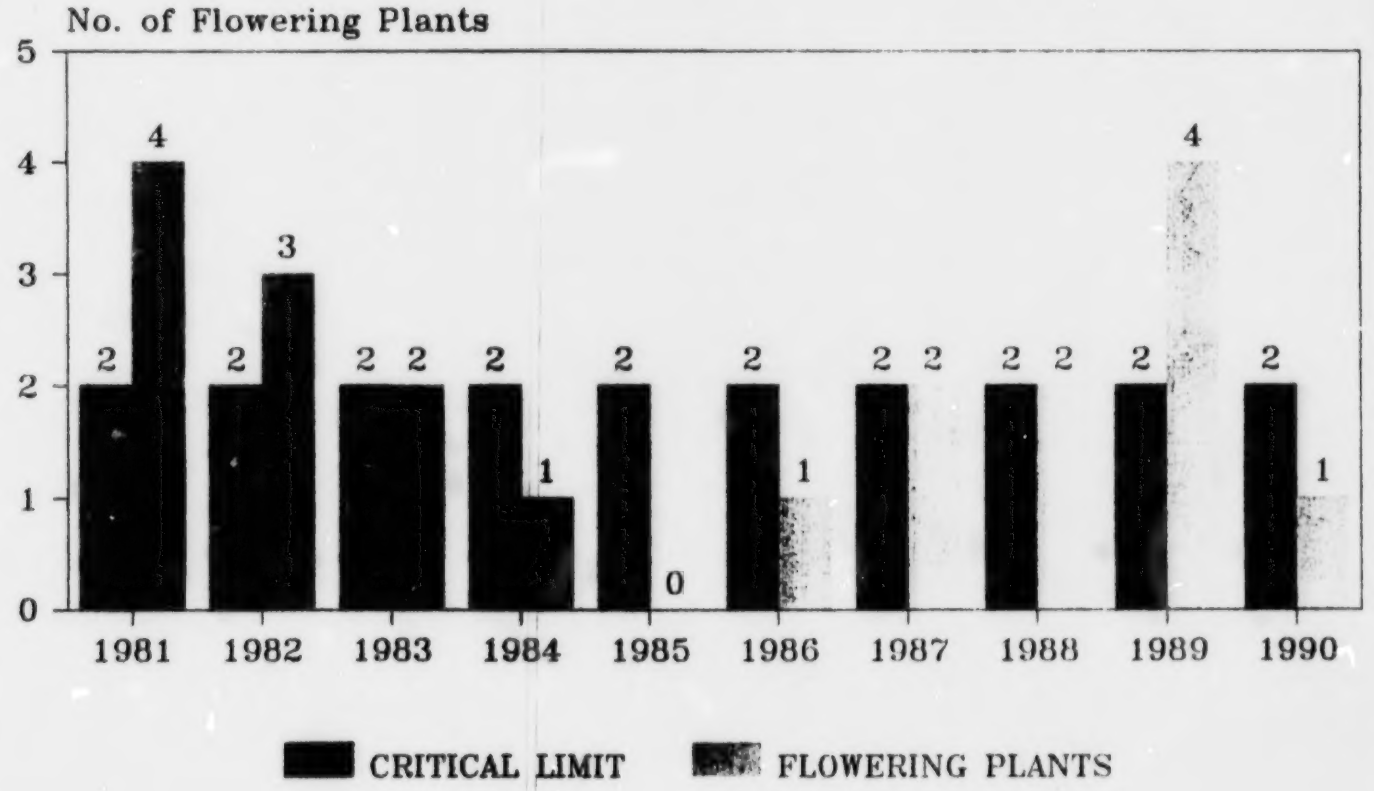
CRITICAL LIMITS *
CREEK BEACH



* as per Moreland, 1988

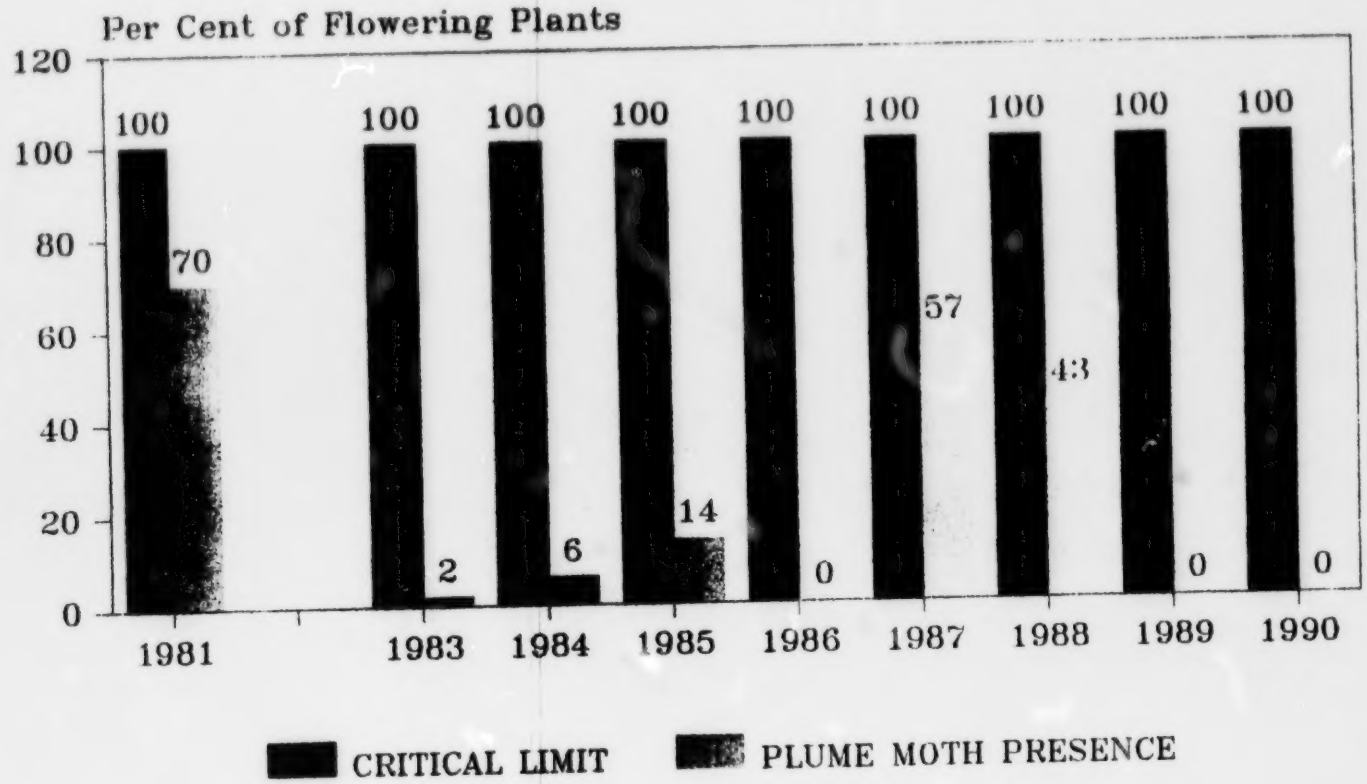
Critical Limits - Flowering Plants (Creek Beach)

CRITICAL LIMITS *
CRESCENT BEACH



* as per Moreland, 1988

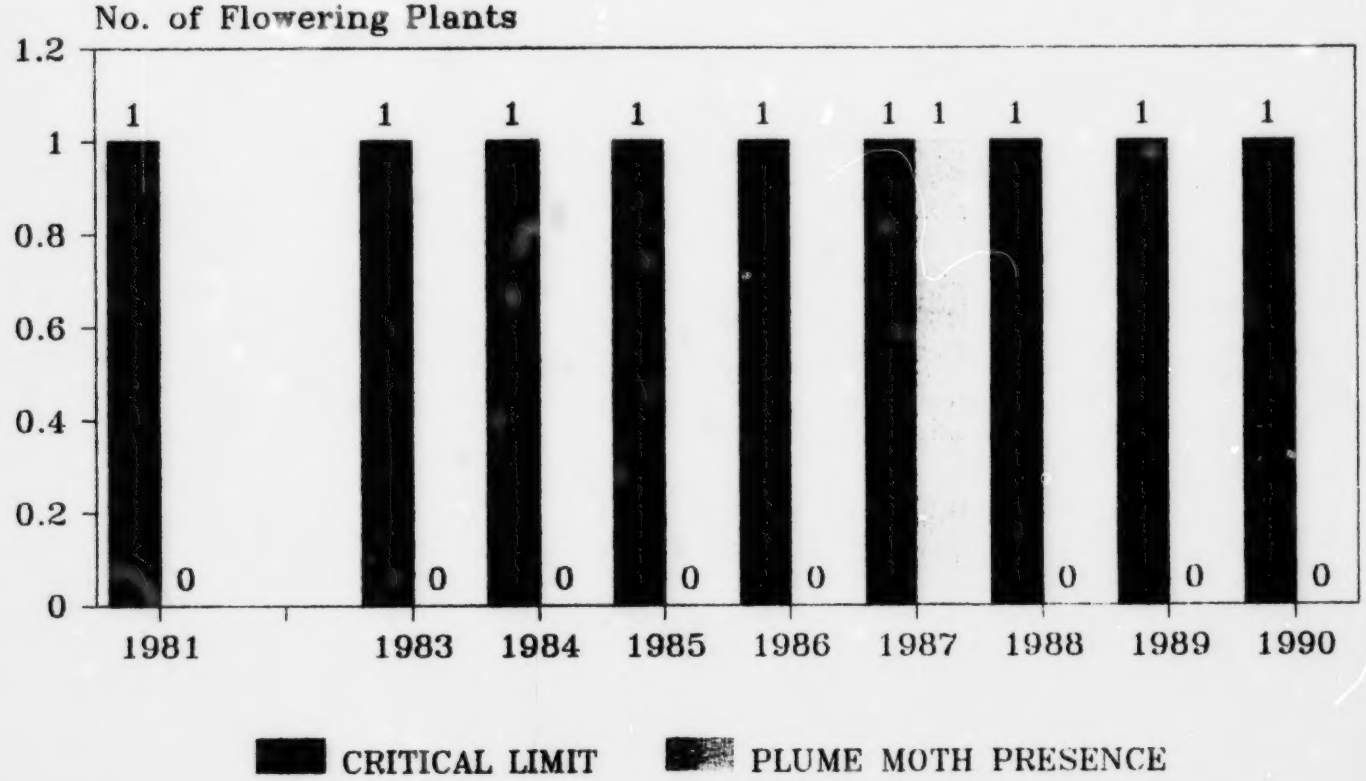
CRITICAL LIMITS *
CREEK BEACH



* as per Moreland, 1988

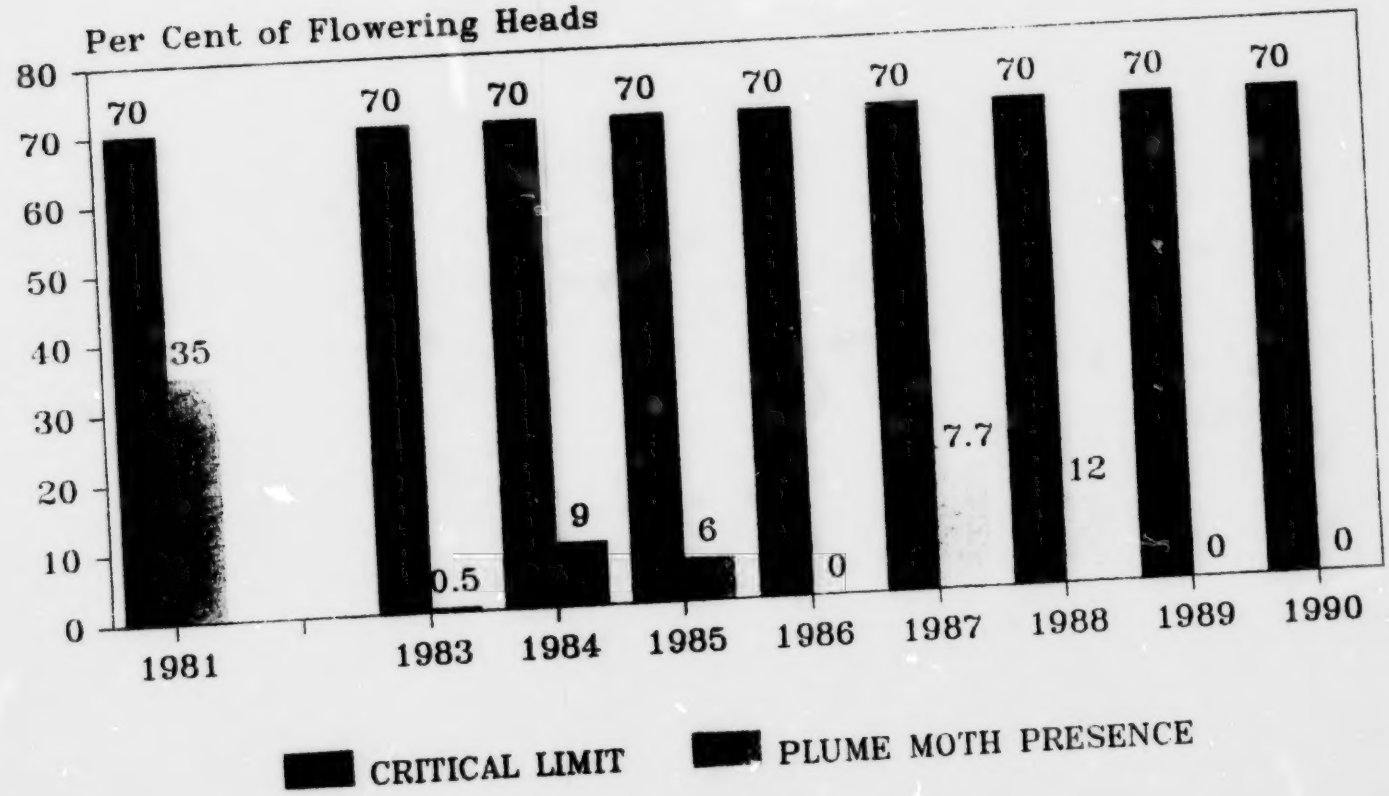
Critical Limits - Plume Moth Presence, Flowering Plants (Creek Beach)

CRITICAL LIMITS *
CRESCENT BEACH



* as per Moreland, 1988

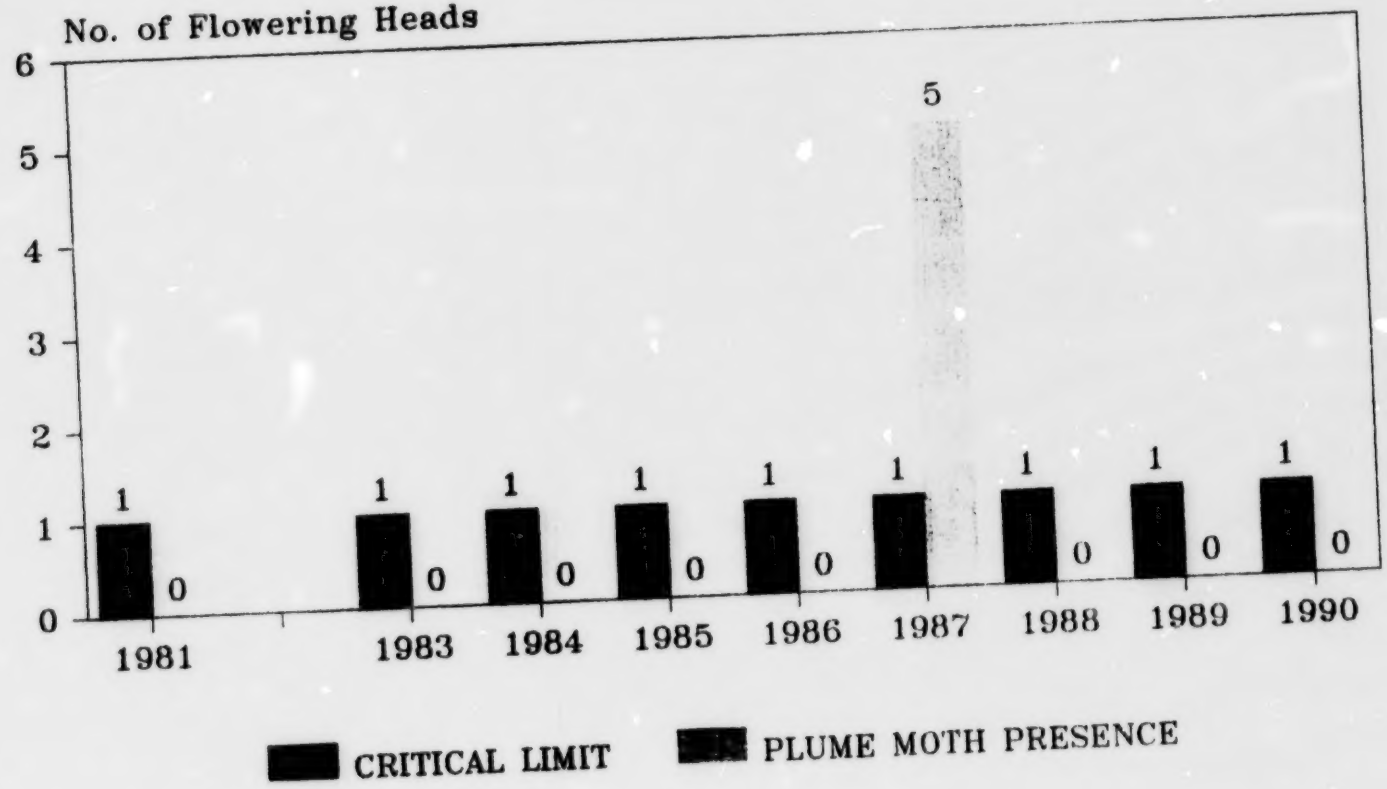
CRITICAL LIMITS *
CREEK BEACH



* as per Moreland, 1988

Critical Limits - Plume Moth Presence, Flowering Heads (Creek Beach)

CRITICAL LIMITS *
CRESCENT BEACH



* as per Moreland, 1988

Critical Limits - Plume Moth Presence, Flowering Heads (Crescent Beach)

7.1 Habitat Change With Respect to the Critical Limit

7.1.1 Creek Beach Colony

YEAR	HABITAT CHANGE NO	YES
1981	X	
1982	X	
1983	X	
1984	X	
1985		Significant storm damage (Sahanatien, 1985: Section 4)
1986		Extensive storm damage (Mosquin, Vien and Sahanatien, 1986: Section 4)
1987	X*	
1988	X	
1989		Noticeable re-establishment of vegetation in areas of 1986 storm damage
1990		Continued re-establishment of vegetation beyond the stage reached in 1989.

* No significant change from the habitat extant after the 1986 storm damage.

7.1.2 **Crescent Beach Colony**

YEAR	HABITAT CHANGE NO	YES
1981	X	
1982	X	
1983	X	
1984	X	
1985		Significant storm damage (Sahanatien, 1985: Section 4)
1986		Extensive storm damage (Mosquin, Vien and Sahanatien, 1986: Section 4)
1987	X*	
1988	X**	
1989		Revegetation of areas disturbed in 1986 is becoming noticeable
1990		Intervals 30 to 36 were completely washed out by spring run-off via re-routed Oiseau Creek; 19 of 35 plants (54%) in 1989 were lost through erosion.

* No significant change from the habitat extant after the 1986 storm damage.

** Beach area larger due to low water levels in Lake Superior.

7.2 Summary of Data With Respect to Critical Limits

CRITICAL LIMIT	STATUS	
	CREEK BEACH COLONY	CRESCENT BEACH COLONY
Total Population	Exceeded	OK
Number of Intervals in Protected Area Containing Plants	OK	Exceeded
Total Number of Flowering Plants	OK	Exceeded
Flowering Plants Affected by Plume Moth	OK	OK
Flowering Heads Affected by Plume Moth	OK	OK
Habitat Change	Exceeded *	Exceeded **
Visitor Activity	OK	OK

* ONLY with respect to the major habitat losses that occurred in 1986; since then there have been no significant detrimental changes; the slow process of natural revegetation of the disturbed areas may be considered to be a beneficial habitat change

** Additional intervals (6) lost above and beyond the major losses of 1986

8.0 DISCUSSION

Whereas in 1989 there was only one critical limit exceeded, this year there are four. This year (as in 1989) the only limit passed at Creek Beach is the total population. At Crescent Beach, however, there are three critical limits that have been exceeded: 1. Number of Intervals in Protected Area Containing Plants, 2. Total Number of Flowering Plants and 3. Habitat Change.

An observation must be made regarding the Crescent Beach situation. In 1989 intervals 30 to 36 comprised a section of the colony heavily affected by erosion as a result of the 1986 storm. (See Figure 9) Total area of thistle habitat in these 7 intervals is much less than in any other seven intervals in the colony, yet 19 of 35 plants in 1989 were located in intervals 30 to 36. Over half of last year's total plants was literally washed away when a thirty-five meter long stretch of habitat completely disappeared. Hence, the critical limit for number of intervals containing plants easily dropped to two below the threshold by reason only that those intervals no longer exist. It would be a somewhat different situation if the critical limit referred to existing habitat that was devoid of plants.

At Crescent Beach the critical limit regarding habitat change has also been exceeded. As in 1986, with the initial flash flood damage, a significant portion of habitat was not only changed but entirely lost. The change is due to an uncontrollable natural phenomenon and again, should be viewed as a situation which is in contrast to that of existing habitat which does not support Pitcher's Thistle.

The erosion factor has less of a relationship to the critical limit of total flowering plants at Crescent Beach than to the other two critical limits exceeded this year. The totals over the years have ranged from 4 to 0 with the ten year average being 2 flowering plants per year. When the critical limit of 2 was initially set it was not known that this figure would be shown to have been the norm over ten years of monitoring. Nevertheless, the consistently low number of flowering plants suggest that Crescent Beach is less suitable habitat than Creek Beach in terms of offering the required conditions for rosettes to advance to the flowering plant stage. The Crescent Beach colony would seem to warrant greater attention should active management be practised.

The maturation rate of three more seedlings was determined this year. Eighteen tagged seedlings have now been monitored to the flowering plant stage and, on average, it has taken 5.7 years for maturation (range is from 2 years to 9 years). Only one of these seedlings has been at Crescent Beach. Far fewer seedlings have been found at Crescent Beach than Creek Beach (186 vs 517). Of the 186 at Crescent Beach, 104 were found in one year (1985) and the entire 104 were lost in 1986 to the flash flood. Many others have been lost to wind storm damage in 1985. Except for one extraordinary year of germination, Crescent Beach has shown a generally low productivity regarding seedling regeneration. This supports the view that seedling germination requires a very exacting set of conditions and that the Crescent Beach habitat is less conducive to germination than is Creek Beach.

Given the apparent difference between the two colonies, it would appear that uncontrollable natural events are likely to have a more pronounced effect on the critical limits at Crescent Beach.

The loss of a significant number of intervals this year at Crescent Beach can be compared to the major losses at both colonies in 1986. The 1986 monitoring report expressed concern at that time about the "imminent extirpation" of C. pitcheri in Pukaskwa National Park due to the impact of the flash flood. This concern has not been supported in the four years after the event. As an example, at Creek Beach the number of flowering plants has steadily risen from 7 in 1986 to 31 in 1990. In 1981, 40 out of the 611 (6.6%) plants were flowering plants. Ten years later, after losing about half of the habitat area, 31 out of 155 plants (20%) are flowering plants. Although totals for seedlings and rosettes do not compare as favourably since the flash flood, they do not present the image of imminent extirpation after four years.

It can be seen that, over time, the major factor affecting critical limits for the Park's Pitcher's Thistle has been the damage resulting from uncontrollable natural phenomena. Without the loss of a great portion of habitat, the significance of the recent critical limit attainments would be different. It would appear that the population is not in imminent danger of extirpation, but that the plant's biological characteristics are permitting it to adequately survive at lower numbers.

9.0 MANAGEMENT RECOMMENDATIONS

1. Observation:

The number of critical limits reached has not increased at Creek Beach but has increased to three at Crescent Beach. This is a departure from the previous year where there had been a decrease in the number exceeded. The thresholds being used still follow the initial limits set as modified by an adjustment factor applied to rosettes and flowering plants (Moreland 1988). The critical limits are currently under review by a consultant and it is expected that once completed, the critical limits will be revised to reflect a more realistic approach to managing C. pitcheri.

Recommendation:

The revised critical limits should be adopted and, if necessary, the appropriate management action should be approved and followed through (i.e., if a critical limit is exceeded then active management should take place).

2. Observation:

Total numbers of seedlings, rosettes and flowering plants have always been significantly lower at Crescent Beach than at Creek Beach. This likely is a result of a combination of smaller colony area and less favourable growing conditions. This increases the vulnerability of Crescent Beach to uncontrollable natural phenomena.

Recommendation:

Since the Crescent Beach colony may be the more sensitive of the two it should receive priority should active management be pursued (i.e., transplanting rosettes).

3. Observation:

There is potential for Oiseau Creek to further erode a section of the eastern end of the colony at Crescent Beach and at the same time become an effective natural barrier to visitors approaching from the east. The Coastal Hiking Trail is still routed, in part, directly behind the Crescent Beach Colony and the original protective rail fence there is deteriorating. There is an interpretive sign at the first approach to the fence but no similar sign where the trail has been re-routed away from the fence. For hikers proceeding north from Crescent Beach there is no initial information advising them of the reason for the fence.

Recommendation:

Recover the interpretive sign that was washed out on Crescent Beach and reposition it to the location where the trail first approaches the rail fence for those hikers travelling north. Make required repairs/improvements to the rail fence. A sign would no longer be required at the beach since the new Oiseau Creek mouth should be an adequate natural barricade. The wording on the sign would not require revision - a problem that was posed last year when there was no rail fence behind which grew rare plants.

4. Observation:

At Creek Beach the current anchor point at which the monitoring intervals are begun will soon become inadequate. Up to and including this year, this point has been found by referring to the wooden corner post of the extended interval (interval #37) toward the south end of the colony.

Recommendation:

The anchor point should consist of two metal posts long enough to be driven well into the sand and become permanent markers similar to that at Crescent Beach. One post would be in line with the original rail fence (south boundary of interval 37) and the other would mark the northwest corner of extended interval 38.

10.0 CONCLUSION

It has been determined that valid critical limits are the key factor in assessing the status of C. pitcheri in the Park. A review of past monitoring has been undertaken by a consultant and a report has reached the final draft stage. The final report will be included as an ammendment to the Rare Plant Management Plan and is expected shortly after this year's monitoring report. In it will be contained the consultant's recommendations on future management of C. pitcheri. Included will be a revised set of critical limits which will become the operating standard for the foreseeable future. This standard should be rigidly followed to ensure that the Park's rare plant management goals are met.

11.0 REFERENCES

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APPENDIX I
MONITORING DATA 1990
CREEK BEACH COLONY

CIRSIUM PITCHERI

Field Data Sheet - Total Population

Colony: Creek Beach
Date: July 17 & 18, 1990

Personnel: Larry Vien, Greg Fenton, Daniel Michano

Interval Number	Number of Seedlings by Habitat				Number of Rosettes by Habitat			Number of Flowering Plants by Habitat			Number of Heads	Number of Flowering Heads	% Flowering	Number of Heads Affected by Plume Moth	Total Number of Plant		
	G	D	S	Tag #	G	D	S	G	D	S					Grass Habitat	Debris Habitat	All Habit.
																1	1
39						1-1											0
38																	
37		2		296	1-1										1	2	3
36																	0
35				55 57 110 60 112 268 269	1-1 1-3 1-1 1-4 (no plant found) (no plant found) 1-1 1-1 1-4 1-1 1-1			#1(1-1)			3	1		0	10	0	10
34																	0
33				202A	1-1			#2(1-1)			14	7		0	2	0	2
32					1-4 1-1										2	0	2
31				A B C	1-8 1-1 1-7 1-1 1-1										5	0	5

Field Data Sheet - Total Population

Colony: Creek Beach Personnel: Larry Vien, Greg Fenton, Daniel Michano
Date: July 17 & 18, 1990

Interval Number	Number of Seedlings by Habitat			Tag #	Number of Rosettes by Habitat			Number of Flowering Plants by Habitat			Number of Heads	Number of Flowering Heads	% Flowering	Number of Heads Affected by Plume Moth	Total Number of Plants		
	G	D	S		G	D	S	G	D	S					Grass Habitat	Debris Habitat	All Habitat
30				D	1-1 1-4 1-3 1-1	1-1									4	1	5
29				201A	1-9 1-5			#3(1-5) #4(1-6) #5(1-1)			6 15 14	3 4 6		0 0 0	5	0	5
28				197A 198A		1-8 1-6 1-1		#6(1-1) #7(1-1) #8(1-8)			13 16 14	4 3 5		0 0 0	3	3	6
27		2		297 279 196A	1-1 1-2	1-2 1-6 1-5 1-1		#9(1-8) #10(1-1)			5 5	0 3		0	3	7	10

CIRSIUM PITCHERI

Field Data Sheet - Total Population

Colony: Creek Beach
Date: July 17 & 18, 1990

Personnel: Larry Vien, Greg Fenton, Daniel Michano

Interval Number	Number of Seedlings by Habitat				Number of Rosettes by Habitat			Number of Flowering Plants by Habitat			Number of Heads	Number of Flowering Heads	% Flowering	Number of Heads Affected by Plume Moth	Total Number of Plant		
	G	D	S	Tag #	G	D	S	G	D	S					Grass Habitat	Debris Habitat	All Habita
26				F	1-1												
					1-7												
						1-1											
						1-1											
						1-1											
						1-1									4	9	13
						1-2											
						1-1											
								#11(1-10)			5	0		0			
								#12(1-5)			9	7		0			
									#13(1-1)		20	6		0			
									#14(1-1)		8	3		0			
									#15(1-2)		5	0		0			
25	1-1			298													
	1-1			299													
	1-1			300													
				270	1-1												
					1-1												
					1-1												
					1-1										16	0	16
				294	1-2												
					1-1												
				271	1-7												
				280	1-1												
					1-1												
					1-1												
								#16(1-1)			32	14		0			
								#17(1-6)			20	9		0			
								#18(1-1)			7	5		0			

Field Data Sheet - Total Population

Colony: Creek Beach
Date: July 17 & 18, 1990

Personnel: Larry Vien, Greg Fenton, Daniel Michano

Interval Number	Number of Seedlings by Habitat			Tag #	Number of Rosettes by Habitat			Number of Flowering Plants by Habitat			Number of Heads	Number of Flowering Heads	% Flowering	Number of Heads Affected by Plume Moth	Total Number of Plant		
	G	D	S		G	D	S	G	D	S					Grass Habitat	Debris Habitat	All Habit
								#19(1-1)			10	1		0			
24					1-1												
					1-3												
					1-1												
					1-1												
					1-1										12	0	12
					1-1												
					1-1												
					1-2												
					1-1												
					1-1												
				282	1-1												
23					1-1												
					1-1												
					1-2												
				36	1-5										10	1	11
					1-1												
					1-1												
						1-1											
								#20(1-1)			16	8					
								#21(1-3)			7	3					
								#22(1-1)			14	8					
								#23(1-5)			1	0					

CIRSIUM PITCHERI

Field Data Sheet - Total Population

Colony: Creek Beach
Date: July 17 & 18, 1990

Personnel: Larry Vien, Greg Fenton, Daniel Michano

Interval Number	Number of Seedlings by Habitat				Number of Rosettes by Habitat			Number of Flowering Plants by Habitat			Number of Heads	Number of Flowering Heads	% Flowering	Number of Heads Affected by Plume Moth	Total Number of Plant		
	G	D	S	Tag #	G	D	S	G	D	S					Grass Habitat	Debris Habitat	All Habit
22	1			301													
	1			302													
					1-1												
					1-2												
					1-4												
					1-2										12	3	15
					1-6												
					1-1												
					1-1												
					1-1												
					1-1												
						1-3											
						1-1											
						1-1											
								#24(1-20)			40	10		0			
21					1-4												
					1-1												
					1-1												
					1-1												
					1-5												
					1-1										12	2	14
				186A	1-1												
				185A	1-1												
				187A	1-1												
				188A	1-1												
					1-1												
				285		1-1											
						1-1											
								#25(1-7)			17	4		0			

CIRSIUM PITCHERI

Field Data Sheet - Total Population

Colony: Creek Beach
Date: July 17 & 18, 1990

Personnel: Larry Vien, Greg Fenton, Daniel Michano

Interval Number	Number of Seedlings by Habitat			Tag #	Number of Rosettes by Habitat			Number of Flowering Plants by Habitat			Number of Heads	Number of Flowering Heads	% Flowering	Number of Heads Affected by Plume Moth	Total Number of Plant		
	G	D	S		G	D	S	G	D	S					Grass Habitat	Debris Habitat	All Habit
20				283	1-5 1-1									0	4	1	5
						1-1		#26(1-1) #27(1-7)			11 13	2 8		0			
19	1 1 1			303 304 305													
					1-1	1-1 1-1 1-1 1-1 1-1									6	5	11
								#28(1-1) #29(1-7)			10 8	6 4		0 0			
18					1-5 1-2 1-1 1-1 1-3										6	2	8
						1-1		#30(1-1)			9 6	7 1		0 0			
									#31	(1-1)					1	0	1
17					1-1												
Totals:	8	4	0		84	28	0	26	5	0	373	142		0	118	37	155

APPENDIX II
MONITORING DATA 1990
CRESCENT BEACH COLONY

CIRSIUM PITCHERI

Field Data Sheet - Total Population

Colony: Crescent Beach
Date: July 18 & 19, 1990

Personnel: Larry Vien, Greg Fenton, Daniel Michano

Interval Number	Number of Seedlings by Habitat			Tag #	Number of Rosettes by Habitat			Number of Flowering Plants by Habitat			Number of Heads	Number of Flowering Heads	% Flowering	Number of Heads Affected by Plume Moth	Total Number of Plant		
	G	D	S		G	D	S	G	D	S					Grass Habitat	Debris Habitat	All Habit
1																	0
2																	0
3																	0
4																	0
5																	0
6																	0
7																	0
8					1-1										1	0	1
9					1-1 1-1 1-1										3	0	3
10	1-1			306											1	0	1
11																	0
12																	0
13																	0
14																	0
15																	0
16																	0
17																	

CIRSIUM PITCHERI

Field Data Sheet - Total Population

Colony: Crescent Beach
Date: July 18 & 19, 1990

Personnel: Larry Vien, Greg Fenton, Daniel Michano

Interval Number	Number of Seedlings by Habitat				Number of Rosettes by Habitat			Number of Flowering Plants by Habitat			Number of Heads	Number of Flowering Heads	% Flowering	Number of Heads Affected by Plume Moth	Total Number of Plant		
	G	D	S	Tag #	G	D	S	G	D	S					Grass Habitat	Debris Habitat	All Habita
18	1-1			286 307	1-1 1-1 1-1										4	0	4
19					1-1										1	0	1
20																	0
21																	0
22				263A	1-1 1-1 1-1 1-1 1-1 1-1 1-1 1-1			#1(1-1)			3	1		0	9	0	9
23																	0
24																	0
25																	0
26					1-1 1-1										2	0	2

CIRSIUM PITCHERI

Field Data Sheet - Total Population

Colony: Crescent Beach
Date: July 18 & 19, 1990

Personnel: Larry Vien, Greg Fenton, Daniel Michano

Interval Number	Number of Seedlings by Habitat			Tag #	Number of Rosettes by Habitat			Number of Flowering Plants by Habitat			Number of Heads	Number of Flowering Heads	% Flowering	Number of Heads Affected by Plume Moth	Total Number of Plant		
	G	D	S		G	D	S	G	D	S					Grass Habitat	Debris Habitat	All Habit
																	0
27																	0
28																	0
29																	
Total	2	0	0		18	0	0	1	0	0	3	1	33%	0	21	0	21